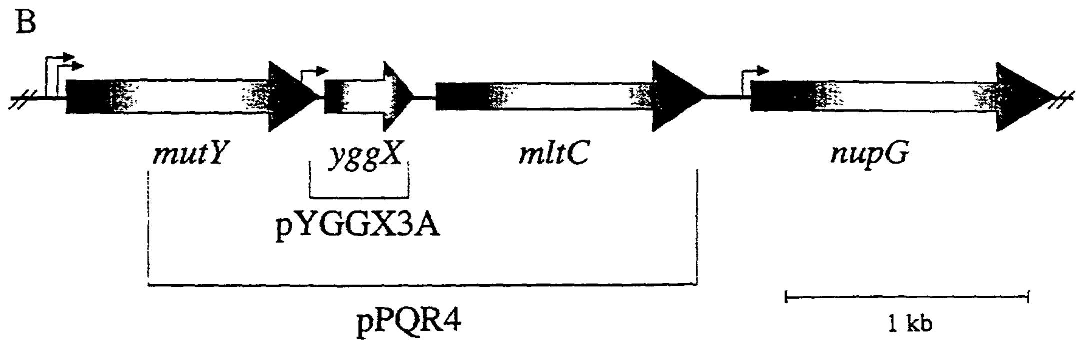

Fig. 1. Physical parameters of *yggX* and its gene product. (*A*) Alignment of YggX homologs. (*B*) Operon structure of *mutY/yggX* in *E. coli* and *S. enterica* LT2. Promoters were mapped by Gifford and Wallace in *E. coli* (43).

#3

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Bpertussis        1 MSRIVNCVKLKREAEGLDFPPYPGELGTRIWQQISKEAWEEWKQIQTRLVNENRLNLADA
Bparapert         1 MSRIVNCVKLKREAEGLDFPPYPGELGTRIWQQISKEAWEEWKQIQTRLVNENRLNLADA
Bbronchi          1 MSRIVNCVKLKREAEGLDFPPYPGELGTRIWQQISKEAWEEWKQIQTRLVNENRLNLADA
A.actin           1 MARMVFCERLKQEAEGLDFQLYPGELGKRIFDSISKQAWGEWMKKQTMLVNEKKLNMMNA
Pmultocida        1 MARTVFCEYLKQESEGLDFQLYPGELGKRIFDSISKQAWREWMKKQTMLVNEKKLNMMNA
Hinfluenzae       1 MARTVFCEYLKKEAEGLDFQLYPGELGKRIFDSVSKQAWGEWIKKQTMLVNEKKLNMMNA
Hducreyi          1 MARMVFCEYLKKEAEGLDFQLYPGELGKRIFNSISKQAWAEWIKKQTMLVNEKKLNMMNP
Sputrefasciens    1 MARTVNCVHLNKEADGLDFQLYPGDLGKRIFDNISKEAWGLWQKKQTMLINEKKLNMMNV
Vcholerae         1 MARTVFCTRLQKEADGLDFQLYPGELGKRIFDNICKEAWAQWQTKQTMLINEKKLNMMDP
Ecoli             1 MSRTIFCTFLQREAEGQDFQLYPGELGKRIYNEISKEAWAQWQHKQTMLINEKKLNMMNA
O157_H7EDL933     1 MSRTIFCTFLQREAEGQDFQLYPGELGKRIYNEISKEAWAQWQHKQTMLINEKKLNMMNA
O157_H7           1 MSRTIFCTFLQREAEGQDFQLYPGELGKRIYNEISKEAWAQWQHKQTMLINEKKLNMMNA
Spara             1 MSRTIFCTYLQRDAEGQDFQLYPGELGKRIYNEISKDAWAQWQHKQTMLINEKKLNMMNA
Senteritidis      1 MSRTIFCTYLQRDAEGQDFQLYPGELGKRIYNEISKDAWAQWQHKQTMLINEKKLNMMNA
Sdublin           1 MSRTIFCTYLQRDAEGQDFQLYPGELGKRIYNEISKDAWAQWQHKQTMLINEKKLNMMNA
StyphiCT18        1 MSRTIFCTYLQRDAEGQDFQLYPGELGKRIYNEISKDAWAQWQHKQTMLINEKKLNMMNA
Styphimurium      1 MSRTIFCTYLQRDAEGQDFQLYPGELGKRIYNEISKDAWAQWQHKQTMLINEKKLNMMNA
Kpneumo           1 MSRTIFCTFLQREADGQDFQLYPGELGKRIYNEISKEAWAQWQHKQTMLINEKKLSMMNP
Ypesits           1 MSRTIFCTFLKKDAERQDFQLYPGEIGKRIYNEISKEAWSQWITKQTMLINEKKLSMMNI
Buchnera          1 MNRIIFCTFFKKKSEGQDFQSYPGKLGKKIYDQISKKAWEKWIEKQTILINEENLNMFNL
Xfastidiosa       1 MQRIIFCEYEQRDTEGLDFVPYPGELGQKIFACIGKVGWAAWLVHQTMLINENRLSPRNP
Psyring           1 MTRTVMCRKYKEELPGLERAPYPGAKGEDIFNHVSQKAWADWQKHQTLLINERRLNMMNA
Pputida           1 MTRTVMCRKYQEELPGLERPPYPGAKGQDIFEHISQKAWADWQKHQTMLINEKRLNMMNA
Paeruginosa       1 MSRTVMCRKYHEELPGLDRPPYPGAKGEDIYNNVSRKAWDEWQKHQTMLINERRLNMMNA
Ngonorrhoeae      1 MARMVFCVKLNKEAEGMKFPPLPNELGKRIFENVSQEAWAAWTRHQTMLINENRLSLADP
NmeningitB        1 MARMVFCVKLNKEAEGMKFPPLPNELGKRIFENVSQEAWAAWTRHQTMLINENRLSLADP
NmeningitA        1 MARMVFCVKLNKEAEGMKFPPLPNELGKRIFENVSQEAWAAWTRHQTMLINENRLSLADP
Bmallei           1 MARMIHCAKLGKEAEGLDFPPLPGELGKRLYESVSKQAWQDWLKQQTMLINENRLNMADP
Bpseudomallei     1 MARMIHCAKLGKEAEGLDFPPLPGELGKRLYESVSKQAWQDWLKQQTMLINENRLNMADP
Tferrooxidans     1 MSRMVQCVKLGHEAEGLDRPPYPGALGARIYQEVSKEAWQGWLKHQTMLINEYRLSPIDP
Mcapsulatus       1 MARRIICAKLGIEADGLDAPPFPGPQGQRIFEHVSKEAWQDWLKLQTMLINEHRLTPFEA
Cburneti          1 MTRRIICQKLGKEADALNYSPYPGELGERIYNHISEQAWQAWLSHQTMLINEYRLSLIDP
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Fig. 1A

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Bpertussis         61 RARKYLQQQMERFLFEDGTVEAQGYVP----
Bparapert          61 RARKYLQQQMERFLFEDGTVEAQGYVP----
Bbronchi           61 RARKYLQQQMERFLFEDGTVEAQGVP-----
A.actin            61 EHRKLLEQEMVNFLFEGKDVHIEGYTPPEAK
Pmultocida         61 DHRQLLEQEMVNFLFEGKDVHIEGYVP----
Hinfluenzae        61 EHRKLLEQEMVNFLFEGKDVHIEGYVP----
Hducreyi           61 EHRQLLEAEMVNFLFEGKDVHIDGYVP----
Sputrefasciens     61 DDRKFLEAQMTSFLFEGKDVEIEGFVPE---
Vcholerae          61 EHRKLLEQEMVNFLFEGKEVHIEGYTPPAK-
Ecoli              61 EHRKLLEQEMVNFLFEGKEVHIEGYTPEDKK
O157_H7EDL933      61 EHRKLLEQEMVNFLFEGKEVHIEGYTPEDKK
O157_H7            61 EHRKLLEQEMVNFLFEGKEVHIEGYTPEDKK
Spara              61 EHRKLLEQEMVSFLFEGKDVHIEGYTPEDKK
Senteritidis       61 EHRKLLEQEMVSFLFEGKDVHIEGYTPE---
Sdublin            61 EHRKLLEQEMVSFLFEGKDVHIEGYTPEDKK
StyphiCT18         61 EHRKLLEQEMVSFLFEGKDVHIEGYTPEDKK
Styphimurium       61 EHRKLLEQEMVSFLFEGKDVHIEGYPTEDKK
Kpneumo            61 EHRKLLEQEMVQFLFEGK-------------
Ypesits            61 EDRKLLEQEMVNFLFEGQDVHIAGYTPPSK-
Buchnera           61 EHRKKIEKYMKLFLFK---------------
Xfastidiosa        61 SHRAFLEEELNKFLFERRVAKPEGYIEPD--
Psyring            61 EDRKFLQTEMDKFLSGEEYAQAEGYVPPEK-
Pputida            61 EDRKFLQAEMDKFFAGEEYAQAEGYVP----
Paeruginosa        61 EDRKFLQQEMDKFLSGEDYAKADGYVP----
Ngonorrhoeae       61 RAREYLAQQMEQYFFGDGADAVQGYVPQ---
NmeningitB         61 RAREYLAQQMEQYFFGDGADAVQGYVPQ---
NmeningitA         61 RAREYLAQQMEQYFFGDGADAVQGYVPQ---
Bmallei            61 RARQYLMKQTEKYFFGEGADQASGYVP----
Bpseudomallei      61 RARQYLMKQTEKYFFGEGADQASGYVP----
Tferrooxidans      61 KSRTFLEKQMEAYFFGDGAQSPEGYVP----
Mcapsulatus        61 SARKFLEQEREKFLFGGGTSTPQGYVP----
Cburneti           61 KARQFLEQEMINFLFGTGSEKPAGYTSE---
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Fig. 1A (continued)

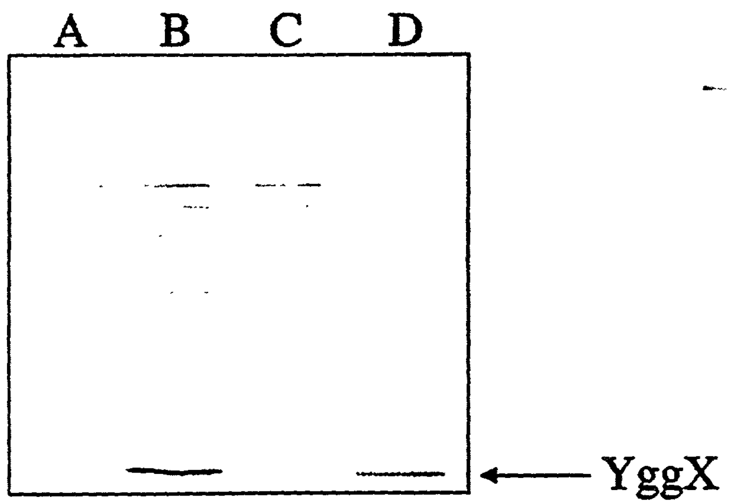

Fig. 2. Increased levels of YggX protein in *yggX** mutant. Western blot analysis was performed according to Harlow and Lane (59). Proteins were visualized by using alkaline phosphatase conjugated to anti-rabbit secondary antibody (Promega). Lanes A–C were loaded with crude cell-free extracts (1 μg protein) from strains DM5104, DM5105 (*yggX**), and DM5647 (*yggX*::Gm), respectively. Lane D was loaded with 1 ng purified YggX.

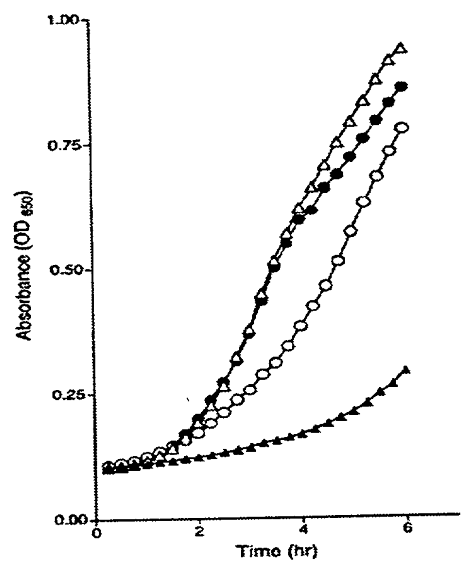

Fig. 3. The *yggX** mutation does not increase MNNG resistance of *gshA* mutants. Strain LT2 was grown in LB with (▲) and without (△) 60 μM MNNG. Both *gshA* (○) and *gshA yggX** (●) mutant strains were grown in LB with 60 μM MNNG.

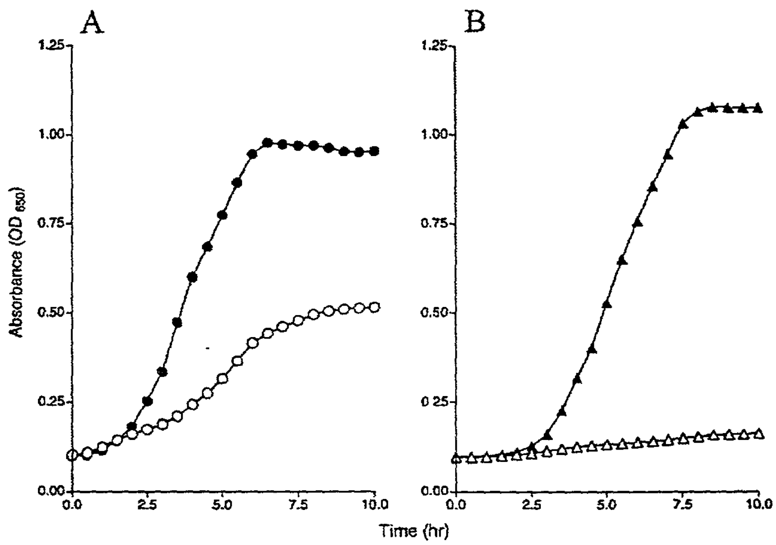

Fig. 4. The *yggX** mutation increases resistance of *S. enterica* to PQ. (*A*) Growth of *gshA* (○) and *gshA yggX** (●) mutant strains in LB with 4 μM PQ. (*B*) Growth of LT2 (△) and *yggX** (▲) strains in LB with 40 μM PQ.

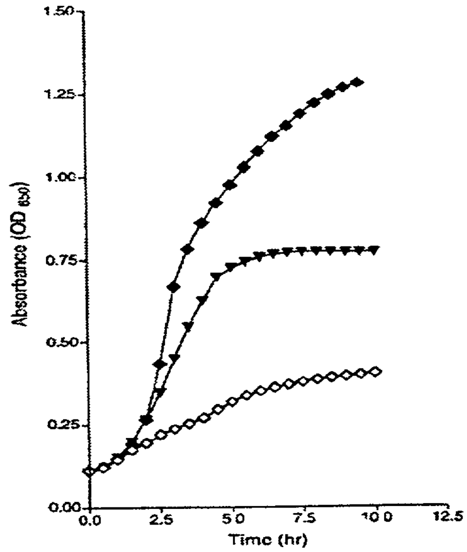

Fig. 5. yggX* does not require soxR to mediate resistance to PQ. Strains LT2 (◆), *soxR* (◇), and *soxR yggX** (▼) were grown in LB with 4.0 μM PQ.

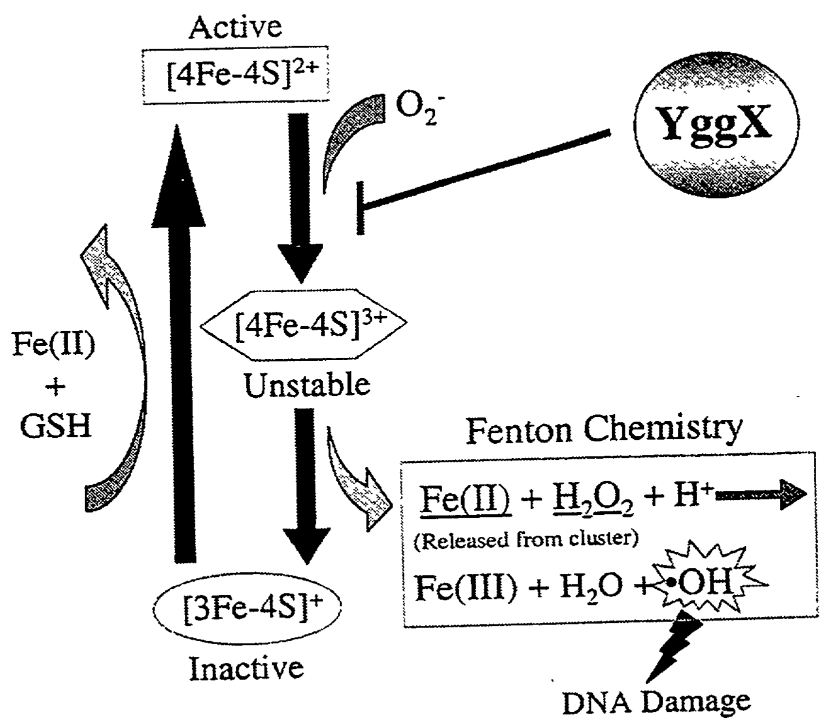

Fig. 6. Model showing how YggX protects *S. enterica* from oxidative damage. The result of superoxide attack on [Fe-S] clusters is depicted. We hypothesize that YggX is able to block oxidative damage to labile clusters and thus prevent the normal downstream consequences of such oxidation.